BiLT System module: BE2850

High Stability Current Source ±2A ±50V

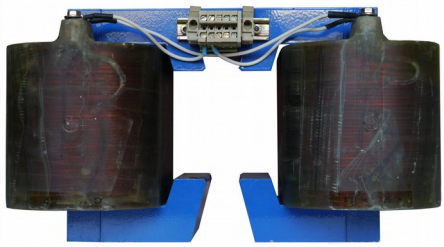
- ✔ *Magnet or Diode Power Supply*
- ✔ *Operates from 0µH to 10H*
- ✔ *Up to 21 bits programming resolution*
- ✔ *Very high proven MTBF*

Main features

- Bipolar current source with no zero-crossing distortion
- Analog and digital control loops offer outstanding noise and stability performances
- Very Low noise: <25ppm peak-to-peak
- Voltage and current read-back
- 2 source models: ***standard*** (BE2850) and ***ultra low drift*** (BE2851)
- Programmable current slope from 10mA/s to 100A/s
- Parallelable power supplies to get higher current
- Safe stop even in case of power outage
- Interlock input
- Synchronization between multiple sources using:
  - Ethernet command
  - module's trigger input
  - chassis BNC trigger input
- No transient when powering on/off or switching on/off
- Proven MTBF > 1M hour
- Custom version on-demand

Application examples

- Magnet Power supply for beam correctors in particle accelerators
- Low noise supply for superconducting coils
- Alignment coils in Scanning Electron Microscope
- Laser or Power Diode biasing and ageing test



BiLT® System features

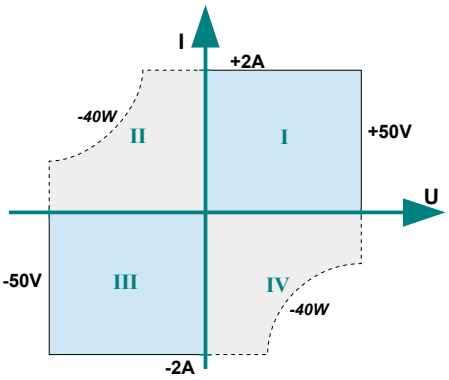
- Module to be inserted in a BiLT® chassis, 5 to 14-slot versions available, up to 1000W output power, no external bulk power supply needed
- Chassis standard interface: Ethernet and USB
- Cost effectiveness for multiple channels: up to 14 BE2850 housed into a single 19" BiLT® chassis
- Complete software package provided, including a free turnkey control PC software (Windows™ or Linux) and NI Labview® driver. TANGO and EPICS drivers available
- Easy remote firmware update of modules and chassis control board

Front view of a 14-slot BiLT chassis

BE2850 module

Operating Area

Parameters	Conditions/Comments	Min	Max
Current	Programming range	-2A	+2A
Voltage range		-50V	+50V
Load inductance	"Low Inductance range" selected	0µH	200mH
	"High Inductance range" selected	0µH	10H
Source power	DC power		100W
Temperature	in front of the chassis rear openings, derate power if exceeded	10°C	40°C
Efficiency	Full load, BE2850 model	87% typ.	



Blue: DC area Grey: transient area

Current DC Performances

All figures are expressed in ppm of the current full scale range.
Two different models are available:

- **Standard (reference BE2850)**: this model offers very good stability performances, using state-of-the-art shunt-based current measurement circuits.
- **Ultra low drift (reference BE2851)**: thanks to a unique proprietary current measurement scheme, this model achieves unrivaled stability performances, without using a DCCT, in the same compact form.

Parameters	Conditions/Comments	"Standard" model BE2850	"Ultra low drift" model BE2851
Resolution	Programming and read-back, including polarity bit	19bit (4ppm)	21bit (1ppm)
Differential linearity error	Guaranteed 20-bit monotonicity	2ppm	2ppm
Integral linearity error		<100ppm	<20ppm
Long term drift (stability)[2]	After 30mn self-heating, constant ambient temp. - at ±2A, for 8 hours - at ±2A, for one month - at ±2A, for one year	<15ppm <200ppm <500ppm	Preliminary data <4ppm <60ppm <200ppm
Thermal drift (TCR)		< ±18ppm/°C	< ±3ppm/°C
Absolute accuracy [1]	1 year, ppm of range + ppm of programmed value	±200ppm ± 800ppm	±70ppm ± 300ppm
Line regulation	Line voltage steps between 180Vac and 230Vac	<2ppm	<2ppm

(1) Ambient temperature: 23°C±5°C
(2) drift figures are non cumulative and tend to stabilize in time. Furthermore, at lower current, performances are improved

Dynamic Performances

The BE2850 module guarantees safe and stable operation for any inductive load value up to 10H.
Two user-selectable operating ranges according to the output inductive load value offer optimized performances:
- Low Inductance range "Low L", for loads whose inductance is up to 200mH
- High Inductance range "High L", for loads whose inductance is up to 10H

Parameters	Conditions/Comments	Low L range		High L range	
		Min	Max	Min	Max
Current Settling time[1]	Small step settling to 95%	20ms		100ms	
Current Slope	Programming range	0,01A/s	100A/s	0,01A/s	0,2A/s
Current Noise (ripple)[2]	0,1Hz-10Hz, peak-to-peak value 10Hz-10kHz, peak-to-peak value	3ppm 25ppm		3ppm 15ppm	
Current programming rate	Ethernet, USB (depending on PC & network performances...)	10Hz to 50Hz		10Hz to 50Hz	
	Internal buffer reading a waveform	10Hz	200Hz	10Hz	200Hz
Voltage noise	At switching frequency (f≥150kHz), peak-to-peak		1mV		1mV

(1) Whatever the inductance value within the specified range
(2) Used loads: Low L range: 10mH + 20Ω, High L range: 1H + 20Ω ; worst case noise amplitude in the whole current range.

BE2850 module

Source description

The BE2850 module is a non-isolated high performance true current source designed to safely and reliably drive magnet loads up to 10H with excellent noise and stability performances. It is also perfectly suited to drive diodes in burn-in or characterization benches for instance.

The BE2850 is a 2-quadrant current source with transient 4-quadrant operation in order to sink the energy stored in the magnet when stopping the power supply or when applying large current changes.

Unlike competitor products, the architecture does not require tuning by complex algorithm to get control loop stability on a very large load inductance range. One must only choose between 2 inductance ranges.
Moreover, the BE2850 source benefits from a greater control loop bandwidth to better reject the output noise coupled by the environment, it exhibits lower wide-band noise, very low noise at switching frequency and exceptional MTBF.

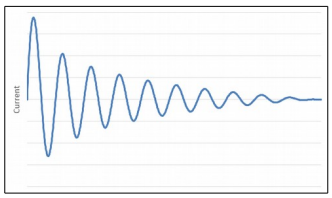
An internal relay shorts the output while the source is off or in case of power outage, protecting the current source. Both the BE2850 module and the BiLT chassis offer an interlock input. The chassis Interlock Input controls all inserted modules. Both the BE2850 module and the BiLT chassis also offer a trigger input. All the BE2850 of the same chassis or several chassis can thus be triggered at the same time thanks to the trigger inputs or a command sent by Ethernet or USB.

Connectors

- Industry-standard screw terminal block:
  - locks to the module with screws
  - long-life contact
  - no crimping tool required
- 15-pin D-SUB connector including power output, voltage sensing, trigger, interlock and status signals.

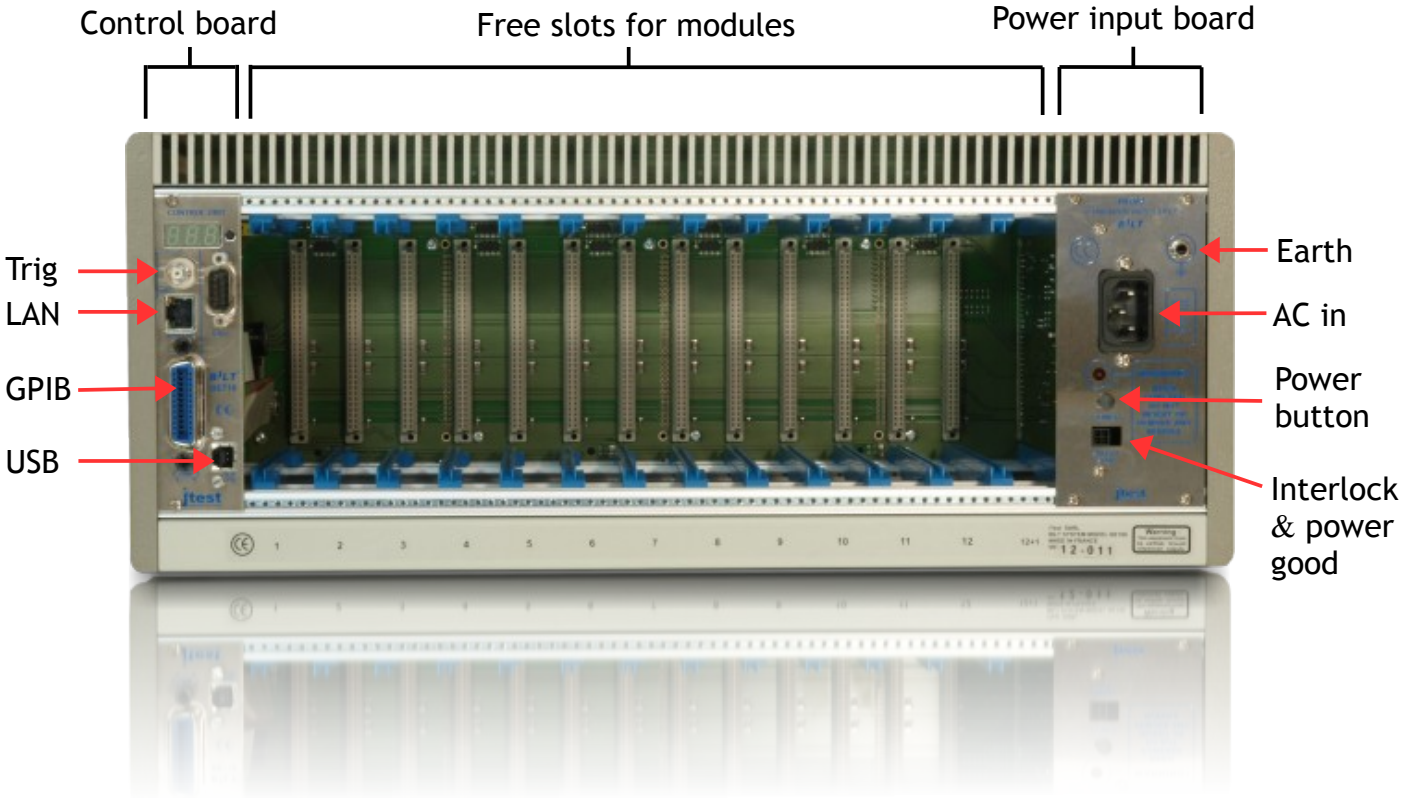
Waveform Generator

A setting buffer allows the user to output any kind of waveform.
The sampling period is programmable from 5ms to 100ms.
The buffer can be read once or looped.



The BiLT System

The best companion for the BE2850 module is the BN120 BiLT chassis. This 19”, 4U chassis is self-ventilated and offers 13 slots to insert modules, the maximum output power is up to 1000W.



BE2850 module

Similar products

According to the customer needs, any other combination of specification can be used to design a new model.

Model	Channel	Current	Voltage	DC power	Application	Inductance range	Settling time	Noise	Drift	Module size
BE2710	1	±10A	24V	120W	Fast orbit feedback corrector magnets in synchrotrons	customizable	60µs	100ppm	100ppm	Double-slot
BE2720	1	±2A	50V	40W		customizable	75µs	100ppm	100ppm	Double-slot
BE2812	1	±15A	8V	120W	General purpose	0µH to 20mH	10ms	24ppm	<24ppm	Double-slot
BE2811	1	±5A	18V	90W	General purpose	0µH to 200mH	10ms	24ppm	<24ppm	Single-slot
BE2860	4	±1,5A	3V	4 x 4,5W	Ultra low noise	0µH to 1mH	100ms	5ppm	10ppm	Single-slot

Documentation			
BE2850 Brochure	1.1	25 March 2019	module datasheet
BE2850 User Manual			module user manual including chassis, communication, software, connection description

Standards, Calibration, Warranty and Maintenance

Bilt system is compliant with the applicable European Directives and holds the CE mark.
Any iTest product comes with a two-year parts and labour guarantee and a calibration certificate if applicable. A telephone support service is also available for the same period.
Our calibration laboratory performs according to ISO/CEI 17025 "*General requirements for the competence of testing and calibration laboratories*". All measurements are traceable to the International System of Unit.
The recommended calibration interval of this product is 1 year.
On request, Itest can proceed to scheduled calibration (in our workshop or at the customer's site).
Maintenance can also be performed on-site or in our workshop.

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